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CASE REPORT

# Endoscopic treatment with wrapping by a vascular prosthesis for internal jugular vein phlebectasia

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**Summary** The management of jugular vein phlebectasia through a transverse cervical incision provides good direct exposure. However, patients having such a procedure will have a scar in the neck, which may be cosmetically unsatisfactory. The authors describe in this communication a transaxillary subfascial endoscopic treatment of internal jugular vein phlebectasia with wrapping by a vascular prosthesis in a 6-year-old boy. The wrapping prevented the vein from dilating, and at the same time preserved its function. The transaxillary endoscopic technique, with a working cavern created under the fascia of the pectoralis major, offered a safe and straightforward way of surgical management of jugular vein phlebectasia, while exempting injury to noninvolved tissues and avoiding the potential for poor cosmesis from any neck scar.


## 1. Introduction

Jugular vein phlebectasia (JVP), a fusiform or spindle dilatation of the jugular vein without tortuosity during the Valsalva maneuver, is a rare benign entity and might involve all cervical veins, with a predilection for the right internal jugular vein.[1] Approximately 100 cases have been reported in the literature.[1] The chief complaint among the patients is a soft, bulging mass in the neck that presents while coughing, laughing, or holding one's breath. Sometimes,

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some patients may complain of slight discomfort during swallowing, hoarseness, and a feeling of the presence of a foreign body in the neck.[1] Surgical intervention is recommended in cases of phlebitis, ruptures, thrombus formation, and in most cases for cosmetic reasons. Ligation and excision of the involved vein through a transverse cervical incision is the procedure most commonly performed.[1] However, the possibility of a cerebrovascular accident, such as postoperative intracranial hypertension and ipsilateral craniofacial swelling, are still dreaded.[1] To prevent postoperative complications and simultaneously preserve function, wrapping with a vascular prosthesis has recently emerged as an alternative.[1,2] However, these patients still have obvious neck scarring. Herein, the authors describe an endoscopic approach of a right internal JVP with wrapping by a vascular prosthesis from the ipsilateral axilla, providing a scarless outcome in the neck.

## 2. Case report

A 6-year-old boy had a nontender, soft, and compressible bulging mass on the right side of the lower neck while coughing, straining, or holding his breath for the past 1 year. He was admitted to hospital with the complaint of signs of increasing severity in recent weeks. The physical examination revealed an obvious 6 cm × 5 cm, nonpulsatile, smooth mass located near the sternocleidomastoid (SCM) muscle during the Valsalva maneuver. In addition, engorgement of the right external jugular vein was noted (Fig. 1). The magnetic resonance images showed that the blood flow of the right external jugular vein drained into the right internal jugular vein (Fig. 2). Neither a superior mediastinal mass causing obstruction nor an arteriovenous malformation was present. JVP was present in the right internal and right external jugular veins simultaneously. With concerns about the esthetic appearance of the scar, an approach from the right axilla was considered; an endoscopic approach was elected. Because the carotid sheath was located beneath the investing layer of the deep cervical fascia, it was planned to create a working plane between the deep fascia and the pectoralis major muscle (Fig. 3).

The surgical technique was based on that described in a previous publication.[3] Under general anesthesia, the patient was placed in the supine position with the neck slightly extended. A 5-mm, 30° endoscope with two additional working ports was used for the surgery. The right internal jugular vein was wrapped by a 10-mm vascular prosthesis (Gore-Tex, S1004, W.L. Gore & Associates, Inc., Flagstaff, AZ, USA) and the right external jugular vein was ligated and divided. The diameter of the vascular prosthesis was adopted according to the ultrasound validation of the diameter of the right internal jugular vein in both childhood and adulthood.[4–6] The vascular prosthesis was designed as a T shape. The short side of the prosthesis was lengthened by 35 mm according to the opening of the carotid sheath measured during the operation, whereas the long side was lengthened by 65 mm according to the lesion measured on physical examination. The details of the surgical technique are illustrated in Fig. 3.

Postoperatively, the craniofacial swelling did not appear and recovery was uneventful (Fig. 4). Follow-up sonography 6 months later showed a normal blood flow pattern and no thrombosis in the right internal jugular vein. The caliber of the root of the right internal jugular vein was acceptable with and without the Valsalva maneuver (1.2 cm and 1.0 cm, respectively; Fig. 4). On follow-up magnetic resonance imaging, the diameter of the root of the right internal jugular vein significantly decreased compared with the previous study (Fig. 2). Moreover, both the superficial and anterior jugular veins maintained ordinary dimensions, and there was no increase of collateral veins.

## 3. Discussion

Because of its rarity, the exact cause of internal JVP remains in question. The majority of the cases are idiopathic but several predisposing factors have been suggested: a congenital defect within the muscular layer of the venous wall, mechanical obstruction proximally, external compression of the vein between the head of the clavicle and the cupola of the right lung, inferior jugular bulb deficiency, or a lack of elasticity of the venous wall.[7,8] In the current case, neither mechanical obstruction nor external compression in the lower neck or upper mediastinum was found in the preoperative image study. During the surgery, the internal jugular vein was distended when the blood flow of the vein was occluded proximally or distally (Fig. 3); therefore, the malformation can be explained with simultaneous occurrence of the

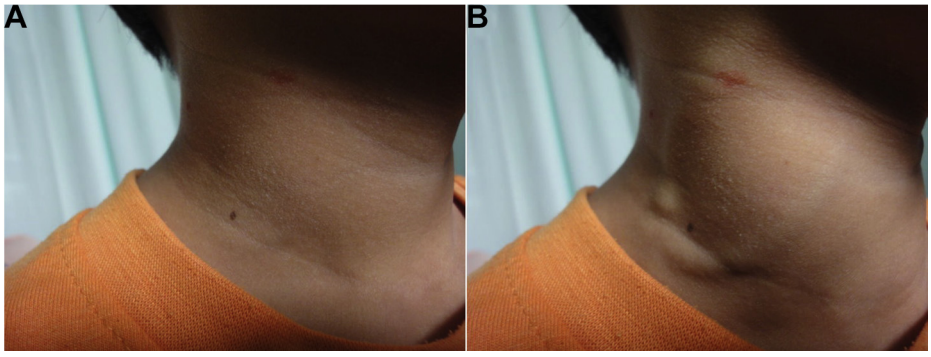


**Figure 1** (A and B) Comparison of same region with that in ordinary condition, obvious enlargement of right neck root and engorgement of the right external jugular vein after inspiration to stop venous return from the neck.

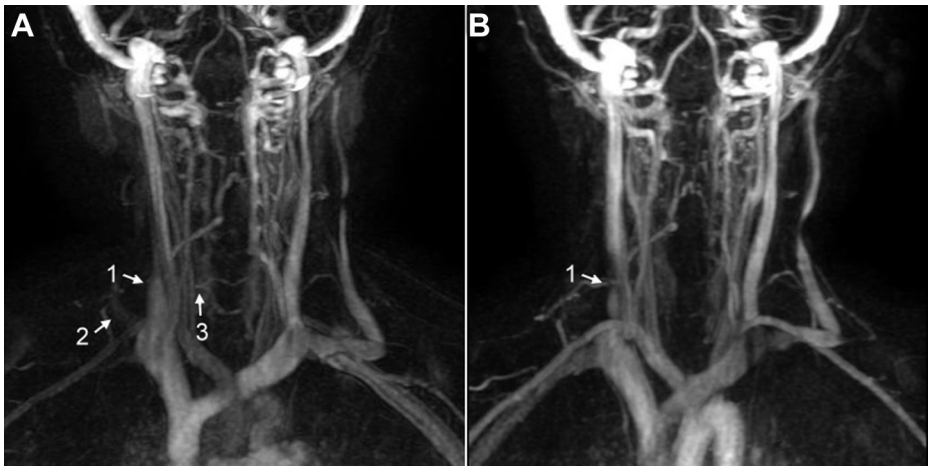


**Figure 2** Minimum-intensity projection T2-weighted high-resolution three-dimensional right internal venograms. (A and B) Before and after surgery, respectively. (A) Relative dilatation of the right external jugular vein (arrow 1). Right internal jugular vein (arrow 2) decreased in diameter. (B) Six months after surgery. The caliber of the root of the right internal jugular vein was significantly decreased (arrow 1) and the right middle thyroid vein was interrupted in comparison with the previous study (arrow 3). Neither superficial veins nor the collaterals were dilated and increased after surgery.

incompetent valve of the inferior jugular bulb and lack of elasticity of the venous wall.

The treatment method in the past was mainly the ligation or resection of the involved vein. However, ligation of the right internal JVP should be performed cautiously because approximately 70% of cerebral blood flow is regurgitated through the right internal jugular vein.[1] For the current case with simultaneous right internal and external JVP, sole management (either ligation/excision or wrapping) of the internal jugular vein may result in ipsilateral compensatory dilatation of the superficial veins and increase of collateral venous return.[3] According to the study by Hu et al,[2] three of 31 cases, for whom the involved vein was ligated or excised, had postoperative complications. Therefore, wrapping of the internal jugular vein and ligation of the external jugular vein were the preferred methods of management. This wrapping can preserve the function of the right internal jugular vein and exempt an increase of collateral venous return (Figs. 2 and 4). The ligation of the external jugular vein can prevent the superficial veins from compensatory dilatation (Fig. 2). However, for long-term outcome, further investigations are needed.

Regarding the surgical approach, a transverse cervical incision provides direct exposure. However, the dissection of the platysma muscle and the investing fascia is not exempted before the carotid sheath is reached. In addition, the division of part of the sternocleidomastoid (SCM) muscle and an extension of the cervical wound are sometimes necessary when the dilated vein is too large and too long to expose.[1] Rapid and improving technologic innovations have allowed surgeons to intervene surgically in neck lesions from a remote side.[9] Transaxillary endoscopic neck surgery has been a well-developed procedure in childhood, including release of torticollis, excision of a thyroglossal duct cyst, and thyroid surgery.[9] However, the reported procedures are all subcutaneous in approach. Because the carotid sheath is located beneath the SCM muscle and the investing layer of deep cervical fascia, which is reported to continue to the fascia of the pectoralis major, surgeons must have come across the subcutaneous fat on crossing the clavicle and subsequently the platysma muscle and the investing fascia prior to the exposure of the carotid sheath. To provide a more straightforward exposure of the carotid sheath, the authors have developed a modified transaxillary endoscopic technique performed between the deep fascia and the pectoralis major muscle.[8] The subfascial approach can not only completely exempt injury to the superficial vein and the overlying skin, but also directly approach the carotid sheath without traversing and dissecting the overlying investing fascia, the platysma, and SCM muscle.

The technique of transaxillary subfascial dissection has been used for esthetic augmentation mammaplasty.[10] Because the cephalic portion of the fascia of the pectoralis major is more defined and resistant than its inferior portion, this cephalic undermining for a neck lesion can be done easily to keep the fascia in the roof and muscle below. However, some authors may worry that bleeding might be less easily controlled in such a dissecting plane. Because the dissection was performed under the fascia of the pectoralis major, the divided vessel perforators tend to draw back into the muscular tissue and local bleeding would be well controlled.[10] In the current case, neither significant bleeding nor postoperative hematoma was observed.

A number of limitations of the technique have been identified in the published series. The conventional cervical approach for JVP is easily and efficaciously addressed. However, transaxillary endoscopic wrapping, merely for cosmesis, may be controversial, because it may seem to make an easy surgery unnecessarily difficult. With this technique, there is a wide dissection in the working cavern, thus resulting in substantial postoperative pain.[9] In addition, there is a need for familiarization of "new anatomy" and intracorporeal suturing and knot-tying can be time consuming. However, in an era of minimal access surgery, it is important to view the endoscopic approaches as techniques in evolution.

To our knowledge, the current case provides the first report of successful endoscopic treatment for internal JVP

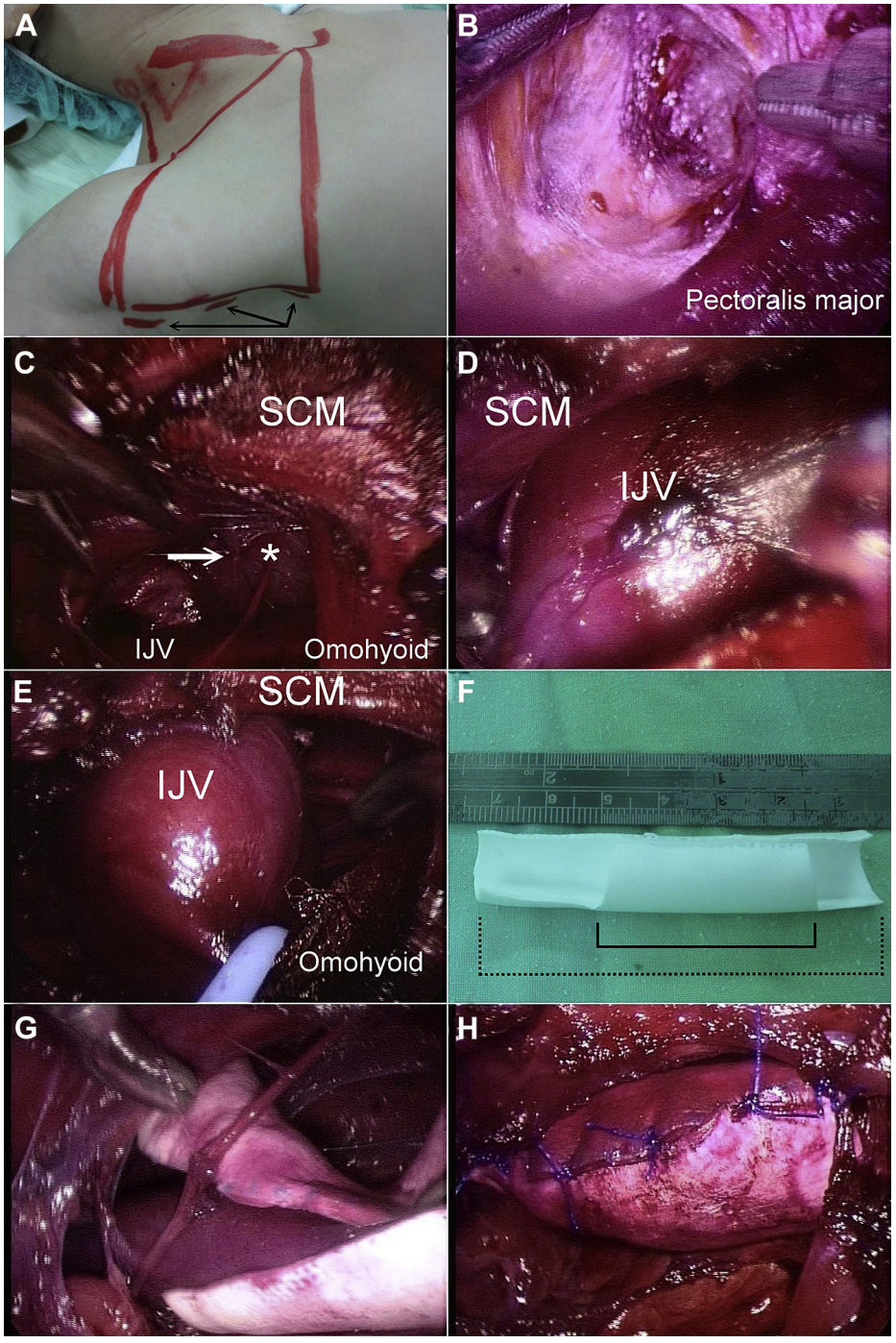


**Figure 3** Intraoperative photographs. (A) The patient's right arm was placed at a 90° angle to the axis of the body, exposing the right axilla. Landmarks including the sternocleidomastoid (SCM) muscle, the sternal notch, the clavicle, posterior triangle of the neck, external jugular vein, plane of dissection, and six incisions (arrows) beneath anterior axillary fold are marked in red on the overlying skin. (B) The surgical plane was created between the deep fascia and the pectoralis major muscle. (C) After the SCM muscle and the omohyoid muscle were clearly exposed, the carotid sheath was identified and opened. The internal jugular vein (IJV) was entirely and safely freed. The inferior root of the ansa cervicalis (asterisk) was identified. The middle thyroid vein (arrowhead) was initially ligated. (D) Occlusion of the distal end of the IJV produced dilatation of the vein with an increase of intrathoracic pressure. (E) The proximal end of the IJV was occluded with a blue vascular tape to show a cystic and compressible mass. (F) The designed prosthesis with the short side lengthened by 35 mm (black line) and the long side lengthened by 65 mm (broken line) was cut open longitudinally. (G) After separation of the anterior aspect of the IJV beyond the opening of the carotid sheath from the surrounding tissues, the prosthesis wrapped the fusiform dilatation of the IJV and its long side was adjusted to cover the anterior aspect of the vein in the neck as far as possible. (H) The cut edges of the prosthesis were sutured to each other using 5-0 polypropylene sutures.

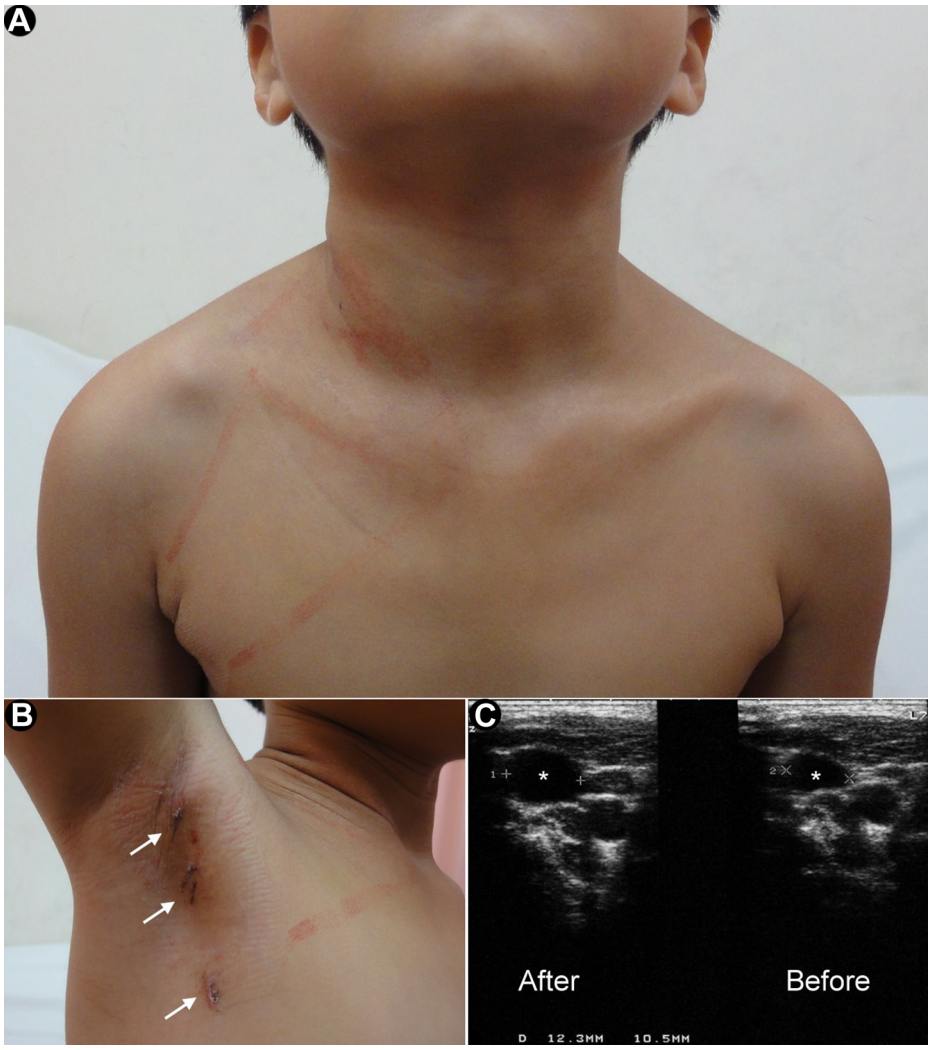


**Figure 4** Cosmetic outcome of transaxillary subfascial endoscopic neck surgery. The photographs were taken 2 weeks after the surgery. (A) No scars were visible when the patient was in an ordinary posture and there were no scars on the neck or anterior chest. (B) White arrows indicate the postoperative axillary scars behind the anterior axillary fold. (C) Sonographic image obtained 6 months after the surgery, showing an adequate caliber of the right internal inguinal vein (asterisk) before and after the Valsalva maneuver.

with wrapping by a vascular prosthesis. The wrapping prevented the internal jugular vein from dilating, and at the same time preserved its function. Without a scar in the neck, the endoscopic approach provided direct access to the lesion from an inconspicuous region. Moreover, the working pocket below the deep fascia would minimize surgical trauma.

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